

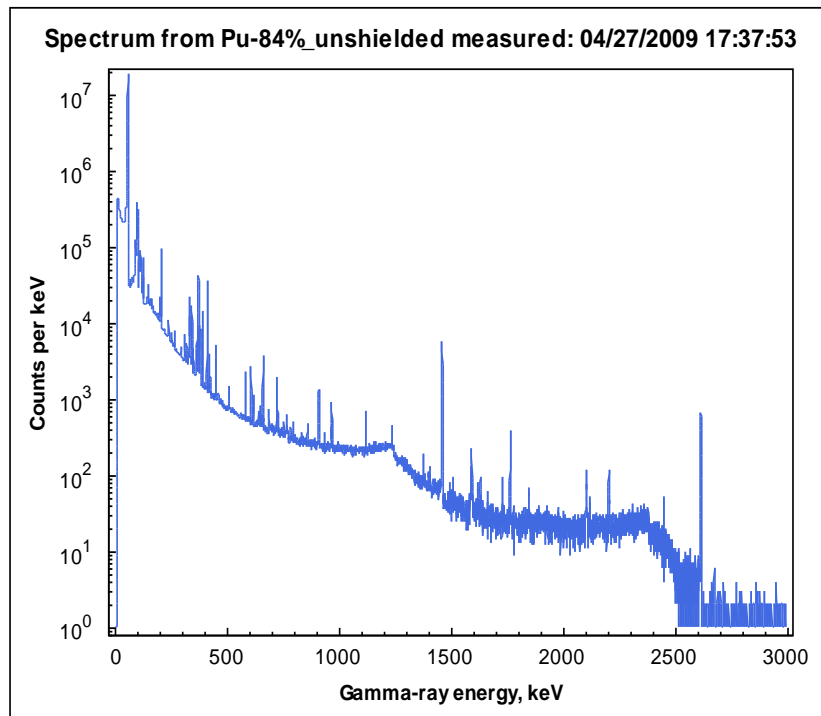
The Nucleonica Gamma Library

www.jrc.ec.europa.eu

Serving society
Stimulating innovation
Supporting legislation

Introduction

- Each gamma-emitting isotope emits photons with a unique set of gamma energies (“gamma signature” or “fingerprint”)

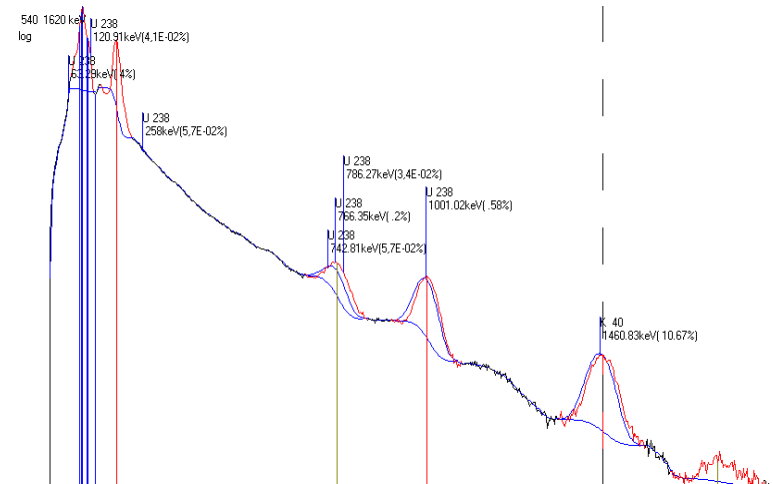


A gamma library is a set of gamma energies with corresponding emission probabilities, emitted by one or more isotopes

Spectrum of Pu, with 84 % of ^{239}Pu





































Introduction

- Various gamma-spectrometric software codes (e.g., ORTEC Gammavision, Canberra Genie2000, WESPA) use libraries to
 - Identify peaks in the spectrum
 - Calibrate the instruments
 - Evaluate the activities of the nuclides
 - Etc.
- The libraries can be created using a range of commercial software, but usually the underlying databases may not be up to date with the most recent nuclear data.

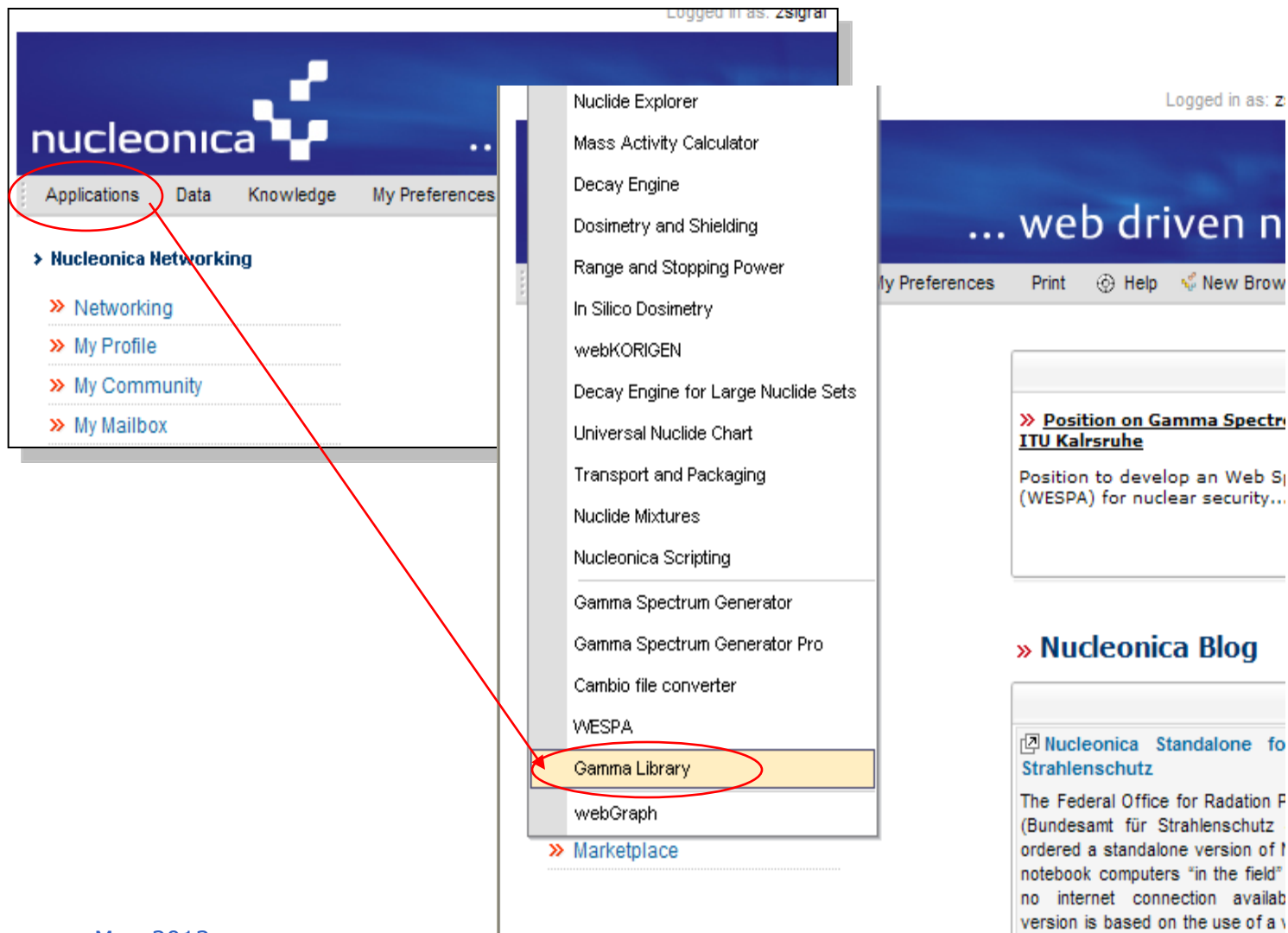


Introduction

- The Nucleonica gamma library module provides a web-based interface for library creation.
- Spectral data can be chosen from the latest internationally evaluated nuclear data in the Nucleonica, 8th Table of Isotopes, or JEFF3.1 databases.
- The libraries created in Nucelonica can be **downloaded to PC** in three formats
 - ORTEC Gammavision
 - Identify (WESPA)
 - Genie2000 (requires converter)

ID ▲	Name	Date Modified	Download	Delete
	(Create a new Library)			
22	Np	10.05.2011, 09:54:09	  	
66	Calibration Sources	19.08.2010, 13:13:31	  	
67	Medical Library	08.07.2010, 16:15:27	  	
72	Background	11.05.2011, 17:49:10	  	
164	Hein-identification	17.01.2012, 19:16:20	  	
177	Age-U232	19.12.2011, 09:14:19	  	
215	U-age-and-U232	19.12.2011, 09:14:34	  	
402	Am to Pu Ratio	26.07.2012, 13:29:52	  	
449	Np237 in Am	05.10.2012, 17:20:06	  	
Total:	9		Page: 1 / 1	

Accessing the Gamma Library module



The screenshot displays the Nucleonica web application interface. The top navigation bar includes 'Applications', 'Data', 'Knowledge', and 'My Preferences'. The 'Applications' menu is expanded, showing a list of modules. A red circle highlights the 'Gamma Library' option in this list. A red arrow points from the 'Applications' tab to the 'Gamma Library' option. The right sidebar contains a 'Position on Gamma Spectroscopy' section and a 'Nucleonica Blog' section.

Logged in as: zsigrai

nucleonica

Applications Data Knowledge My Preferences

» Nucleonica Networking

- » Networking
- » My Profile
- » My Community
- » My Mailbox

Nuclide Explorer

Mass Activity Calculator

Decay Engine

Dosimetry and Shielding

Range and Stopping Power

In Silico Dosimetry

webKORIGEN

Decay Engine for Large Nuclide Sets

Universal Nuclide Chart

Transport and Packaging

Nuclide Mixtures

Nucleonica Scripting

Gamma Spectrum Generator

Gamma Spectrum Generator Pro

Cambio file converter

WESPA

Gamma Library

webGraph

» Marketplace

Logged in as: z

... web driven n

My Preferences Print Help New Brow

» **Position on Gamma Spectroscopy**
ITU Karlsruhe

Position to develop an Web S
(WESPA) for nuclear security...

» **Nucleonica Blog**

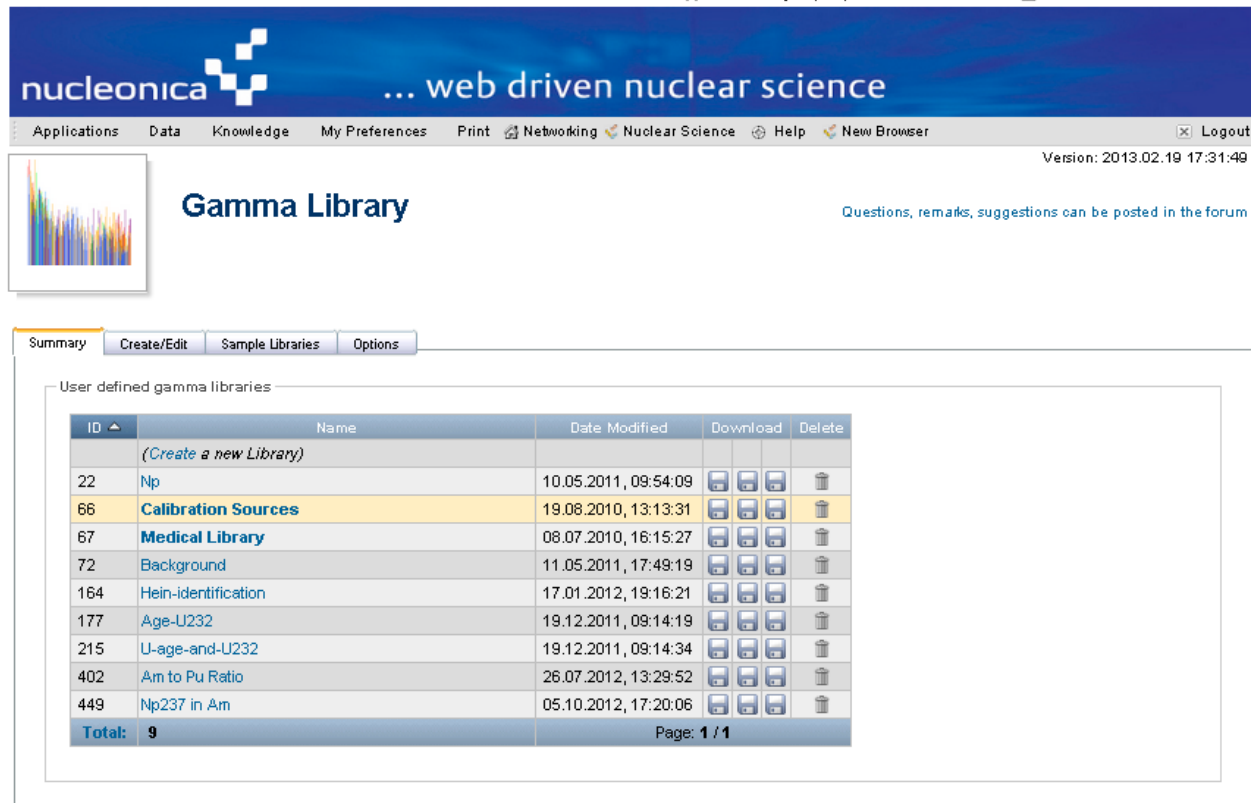
» **Nucleonica Standalone for Strahlenschutz**

The Federal Office for Radiation P
(Bundesamt für Strahlenschutz
ordered a standalone version of I
notebook computers "in the field"
no internet connection availab
version is based on the use of a

May-2013

Welcome to the Library module!

- Create, edit, download, delete your own libraries



The screenshot shows the nucleonica web interface. The header includes the nucleonica logo and the tagline "... web driven nuclear science". Below the header is a navigation bar with links: Applications, Data, Knowledge, My Preferences, Print, Networking, Nuclear Science, Help, and New Browser. A Logout button is also present. The version information "Version: 2013.02.19 17:31:49" is displayed on the right.

The main content area is titled "Gamma Library". To the left of the title is a small icon showing a spectrum. To the right of the title is a link: "Questions, remarks, suggestions can be posted in the forum".

Below the title is a tabbed interface with four tabs: Summary, Create/Edit, Sample Libraries, and Options. The "Summary" tab is currently selected.

The "Summary" tab displays a table titled "User defined gamma libraries". The table has five columns: ID, Name, Date Modified, Download, and Delete. The data is as follows:

ID	Name	Date Modified	Download	Delete
	(Create a new Library)			
22	Np	10.05.2011, 09:54:09		
66	Calibration Sources	19.08.2010, 13:13:31		
67	Medical Library	08.07.2010, 16:15:27		
72	Background	11.05.2011, 17:49:19		
164	Hein-identification	17.01.2012, 19:16:21		
177	Age-U232	19.12.2011, 09:14:19		
215	U-age-and-U232	19.12.2011, 09:14:34		
402	Am to Pu Ratio	26.07.2012, 13:29:52		
449	Np237 in Am	05.10.2012, 17:20:06		
Total:	9			

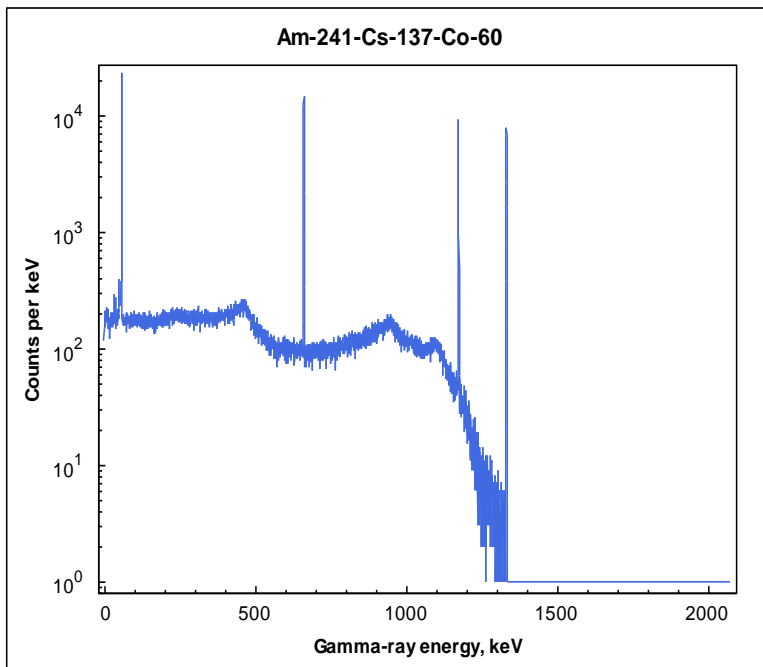
At the bottom right of the table, it says "Page: 1 / 1".

Example

Let's create a library with two nuclides!

- ^{134}Cs
- ^{137}Cs

(Create a new Library)



May-2013





nucleonica ... web driven nuclear science

Applications Data Knowledge My Preferences Print Help New Browser

Gamma Library

Summary Create/Edit Sample Libraries Options

User defined gamma libraries

ID	Name	Date Modified	Download	Delete
	(Create a new Library)			
8	Calibration Sources	19.08.2010, 13:13:31		
9	Medical Library	08.07.2010, 16:15:27		
Total: 2		Page: 1 / 1		

Example

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs

134

☒ Consider daughters

Peak Selection

☐ All Peaks
 ☒ High resolution (HPGe)
 ☐ Low resolution (NaI)
 ☐ Deselect all

Emission type

☒ Gamma lines
 ☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Halflife	Delete
0 Nuclide	Page: 0 / 0	

Daughters from selected Nuclide

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Radiations from selected Nuclide

Energy	Emission Probability	Type
0 / 0 Peak	Page: 0 / 0	

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
Total:	0 Peak	Page: 0 / 0	

Give a name to the library

Enter a description

List of nuclides

Editing area

The created library

May-2013

Example

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs134

2.91 h 2.07 y

Cs

134

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Halflife	Delete
0 Nuclide	Page: 0 / 0	

Radiations from selected Nuclide

Energy	Emission Probability	Type
0 / 0 Peak	Page: 0 / 0	

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
Total:	0 Peak	Page: 0 / 0	

Daughters from selected Nuclide

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Select a nuclide

Add Nuclide

Example

Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart: Karlsruhe

Cs
134
☒ Consider daughters

Peak Selection
☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type
☒ Gamma lines
☒ X-Rays

Cs134

2.91 h 2.07 y

Add Nuclide

Nuclide added

Library Nuclides

Nuclide	Half-life	Delete
55 Cs 134	2.0648 y	
1 Nuclide	Page: 1 / 1	

Daughters from 55 Cs 134

Nuclide	Half-life
0 Daughter	Page: 0 / 0

Radiations from the selected nuclide

Radiations from 55 Cs 134		
Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.04792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray
4.47	1.44e-3	X-Ray

Radiations from the selected nuclide

Radiation Library			
Nuclide	Energy (keV)	Emission Probability	Type
Total:	0 Peak		Page: 0 / 0

Click to select/deselect

May-2013

Joint
Research
Centre

Example

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs134

2.91 h 2.07 y

Cs

134

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Half-life	Delete
55 Cs 134	2.0648 y	
1 Nuclide	Page: 1 / 1	

Daughters from 55 Cs 134

Nuclide	Half-life
0 Daughter	Page: 0 / 0

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray
4.47	4.44e-3	X-Ray

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
Total:	0 Peak		Page: 0 / 0

⇒

⇐

Click to add selected peaks to library

Example

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs

134

Consider daughters

Peak Selection

☐ All Peaks
 ☒ High resolution (HPGe)
 ☐ Low resolution (NaI)
 ☐ Deselect all

Emission type

☒ Gamma lines
 ☒ X-Rays

Add Nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
1 Nuclide Page: 1 / 1		

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray
4.47	1.141e-3	X-Ray
242.8	2.100e-4	Gamma
326.5	1.400e-4	Gamma
847	3.000e-6	Gamma

Save

⇒

⇐

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

Radiations added to the library

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Example

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs134

2.91 h 2.07 y

Cs

134

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Half-life	Delete
55 Cs 134	2.0648 y	
1 Nuclide	Page: 1 / 1	

Daughters from 55 Cs 134

Nuclide	Half-life
0 Daughter	Page: 0 / 0

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray
4.47	1.44e-3	X-Ray

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
Total:	0 Peak		Page: 0 / 0

Controlled by the options

Default peak selection

Setting the options

Options

HPGe

NaI

Select database

Energy range
(absorbers!)

Emission
probability settings
for default peak
selection

Summary Create/Edit Sample Libraries **Options**

Database: Nucleonica

Min. branching ratio for daughters: 0.01

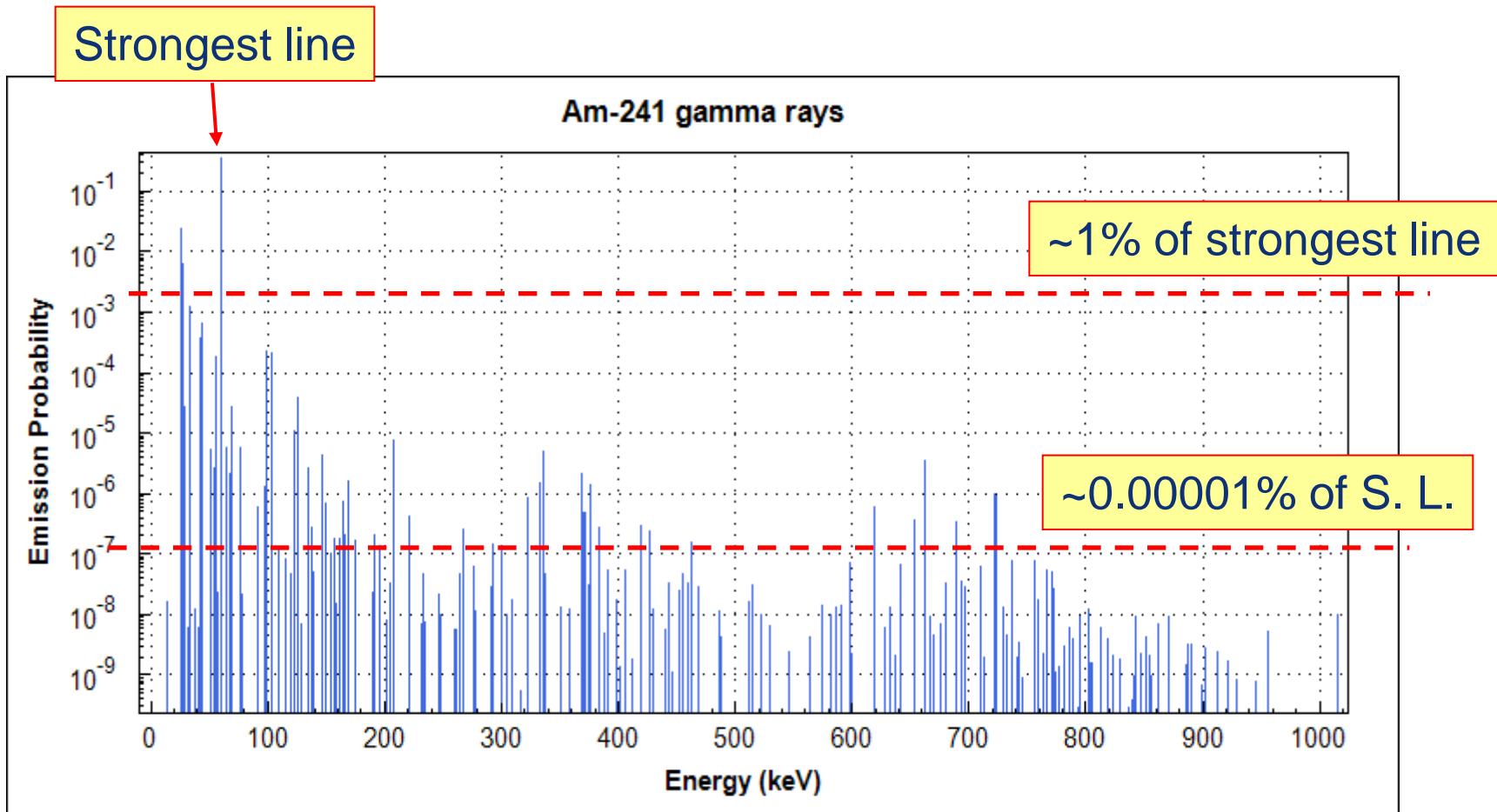
Peak selection: high resolution detectors

Min. Energy	30	keV
Max. Energy	3000	keV
Min. Emission probability	1	% of E.P. of strongest line
Min. Emission probability	1.5	% of E.P. of strongest higher energetic line

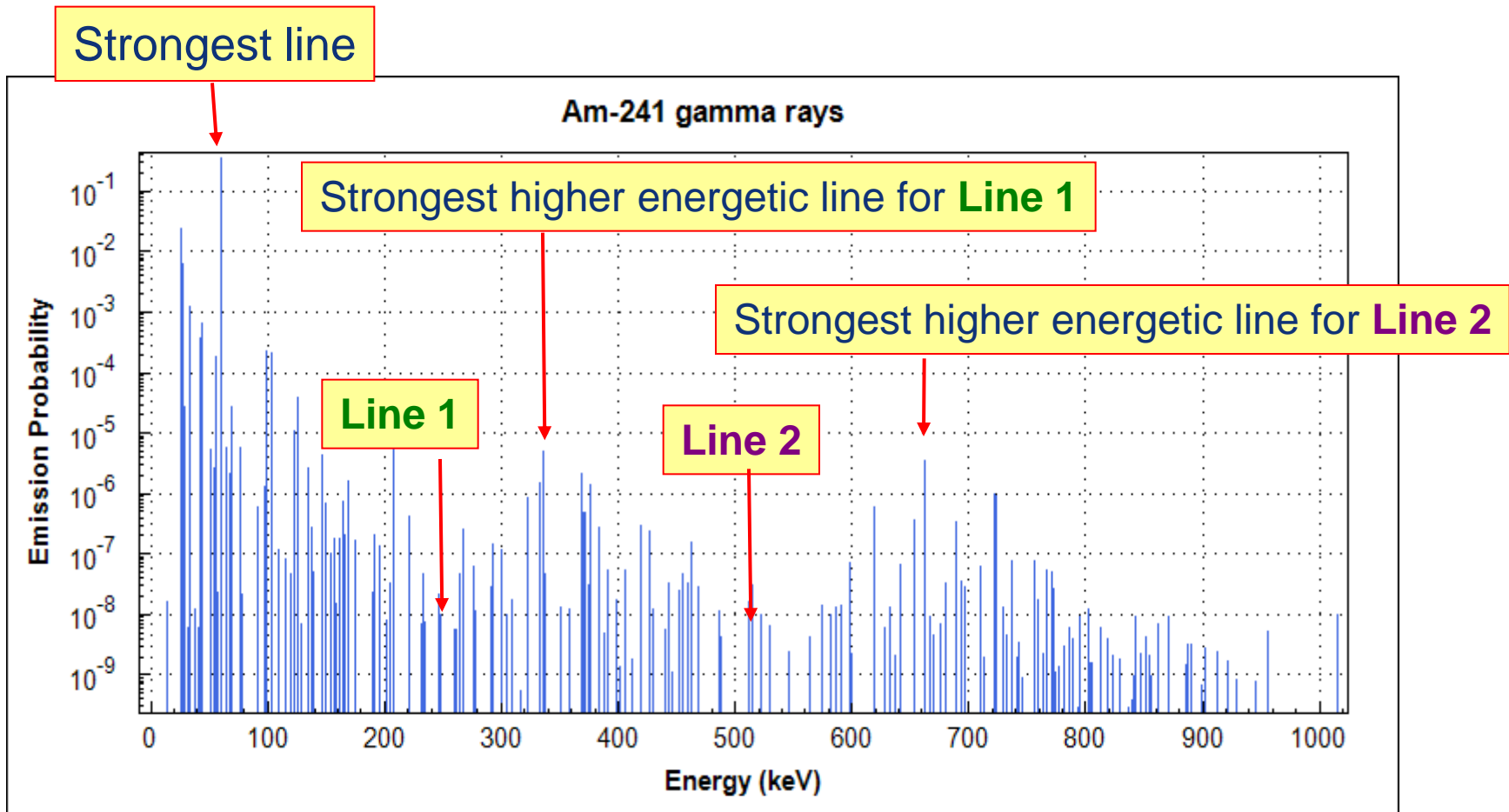
Peak selection: low resolution detectors

Min. Energy	30	keV
Max. Energy	3000	keV
Min. Emission probability	2	% of E.P. of strongest line
Min. Emission probability	5	% of E.P. of strongest higher energetic line

Emission probability settings for default peak selection



Emission probability settings for default peak selection



Example

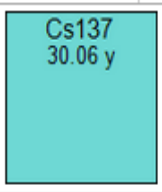
Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart:
Karlsruhe


Cs 137
☒ Consider daughters

Peak Selection
☐ All Peaks
☐ High resolution (HPGe)
☐ Low resolution (NaI)
☒ Deselect all

Emission type
☒ Gamma lines
☒ X-Rays

Cs 137
☒ Consider daughters

Add Nuclide

Select next nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
1 Nuclide Page: 1 / 1		

Radiations from selected Nuclide

Energy	Emission Probability	Type
0 / 0 Peak Page: 0 / 0		

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter Page: 0 / 0	

Example

Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart: Karlsruhe

Cs 137
30.06 y

Cs 137
30.06 y

Add Nuclide

Cs 137
30.06 y

☒ Consider daughters

Peak Selection

☐ All Peaks
☐ High resolution (HPGe)
☐ Low resolution (NaI)
☒ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Save

Library Nuclides

Nuclide	Half-life	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
2 Nuclides		Page: 1 / 1

Radiations from 55 Cs 137

Energy	Emission Probability	Type
283.5	5.800e-6	Gamma
0 / 1 Peak		Page: 1 / 1

Daughters from 55 Cs 137

Nuclide	Half-life
56 Ba 137m	2.55 m
1 Daughter	

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks	Page: 1 / 1	

Cs-137 added

Click to add daughter

Example

Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart: Karlsruhe

Cs 137
30.06 y
☒ Consider daughters

Peak Selection
☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type
☒ Gamma lines
☒ X-Rays

Add Nuclide

Library Nuclides

Nuclide	Half-life	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Radiations from 56 Ba 137m

Energy	Emission Probability	Type
661.7	0.9007	Gamma
32.19	0.03815	X-Ray
31.82	0.02068	X-Ray
36.4	0.01388	X-Ray
4.47	0.01042	X-Ray
4 / 5 Peaks		Page: 1 / 1

Daughters from 56 Ba 137m

Nuclide	Half-life
0 Daughter	
Page: 0 / 0	

Save

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

Example

Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart: Karlsruhe

Cs 137
30.06 y

Cs 137
Consider daughters

Peak Selection
☐ All Peaks
☐ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type
☒ Gamma lines
☒ X-Rays

Save!

Select only one peak for Ba137

Add Nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides	Page: 1 / 1	

Daughters from 56 Ba 137m

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Radiations from 56 Ba 137m

Energy	Emission Probability	Type
661.7	0.9007	Gamma
32.19	0.03815	X-Ray
31.82	0.02068	X-Ray
36.4	0.01388	X-Ray
4.47	0.01042	X-Ray
1 / 5 Peak	Page: 1 / 1	

Click to add selected peak to library

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks	Page: 1 / 1	

Save

How to remove peaks from the library?

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs137

30.06 y

Cs

137

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4		

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

List of nuclides

May-2013

Editing area

The created library

How to remove peaks from the library?

Summary

Create/Edit

Sample Libraries

Options

Name: Cs134+Cs137
Description: Test library

Current Chart: Karlsruhe

Cs 137
30.06 y

Cs 137
30.06 y

Add Nuclide

Cs 137
30.06 y

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

1. Select a nuclide (e.g. Cs134)

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides Page: 1 / 1		

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter Page: 0 / 0	

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray

Save

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

List of nuclides

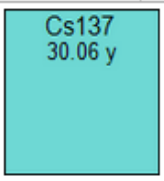
How to remove peaks from the library?

Summary
Create/Edit
Sample Libraries
Options

Name:

Description:

Current Chart:
Karlsruhe



Add Nuclide

☒ Consider daughters

Peak Selection

☐ All Peaks
☒ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray

⇒

⇐

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

Save

Editing area

The created library

How to remove peaks from the library?

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs

137

Consider daughters

Peak Selection

☐ All Peaks
 ☐ High resolution (HPGe)
 ☐ Low resolution (NaI)
 ☐ Deselect all

Emission type

☒ Gamma lines
 ☒ X-Rays

Add Nuclide

Save

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31		
36		
4.47	1.141e-3	X-Ray
242.5	2.100e-4	Gamma

Editing area

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

How to remove peaks from the library?

Summary Create/Edit Sample Libraries Options

Name: Cs134+Cs137

Description: Test library

Current Chart: Karlsruhe

Cs 137 30.06 y

Consider daughters

Peak Selection

- All Peaks
- High resolution (HPGe)
- Low resolution (NaI)
- Deselect all

Emission type

- Gamma lines
- X-Rays

Add Nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	Page: 0 / 0

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31		
36		
4.47	1.141e-3	X-Ray
242.5	2.100e-4	Gamma

Editing area

Save

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	569.32	0.1539	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
55 Cs 134	1.168e+3	0.01792	Gamma
55 Cs 134	475.34	0.015	Gamma
55 Cs 134	1.039e+3	9.910e-3	Gamma
Total:	9 Peaks		Page: 1 / 1

The created library

4. Copy new peak selection to the library

How to remove peaks from the library?

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs137

30.06 y

Cs

137

☒ Consider daughters

Peak Selection

☐ All Peaks
☐ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Add Nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray

Save

Radiation Library

Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
Total:	5 Peaks		Page: 1 / 1

5. The new selection replaces the old peaks from Cs134 in the library

How to remove peaks from the library?

Summary

Create/Edit

Sample Libraries

Options

Name:

Cs134+Cs137

Description:

Test library

Current Chart:

Karlsruhe

Cs137

30.06 y

Cs

137

☒ Consider daughters

Peak Selection

☐ All Peaks
☐ High resolution (HPGe)
☐ Low resolution (NaI)
☐ Deselect all

Emission type

☒ Gamma lines
☒ X-Rays

Save

Add Nuclide

Library Nuclides

Nuclide	Halflife	Delete
55 Cs 134	2.0648 y	
55 Cs 137	30.1671 y	
56 Ba 137m	2.55 m	
3 Nuclides		Page: 1 / 1

Daughters from 55 Cs 134

Nuclide	Halflife
0 Daughter	
Page: 0 / 0	

Radiations from 55 Cs 134

Energy	Emission Probability	Type
604.69	0.9763	Gamma
795.84	0.8552	Gamma
569.32	0.1539	Gamma
801.93	0.08700	Gamma
563.23	0.08380	Gamma
1.365e+3	0.03015	Gamma
1.168e+3	0.01792	Gamma
475.34	0.015	Gamma
1.039e+3	9.910e-3	Gamma
32.19	4.362e-3	X-Ray
31.82	2.364e-3	X-Ray
36.4	1.587e-3	X-Ray

Radiation Library

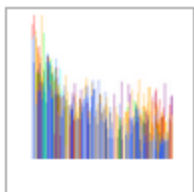
Nuclide	Energy (keV)	Emission Probability	Type
55 Cs 134	604.69	0.9763	Gamma
55 Cs 134	795.84	0.8552	Gamma
55 Cs 134	801.93	0.08700	Gamma
55 Cs 134	563.23	0.08380	Gamma
55 Cs 134	1.365e+3	0.03015	Gamma
Total:	5 Peaks		Page: 1 / 1

Example


... web driven nuclear science

Applications Data Knowledge My Preferences Print Networking Nuclear Science Help New Browser Logout

Version: 2013.02.19 17:31:49



Gamma Library

Summary

marks, suggestions can be posted in the forum

Summary

Create/Edit

Sample Libraries

Options

The created library shows up in the list

User defined gamma libraries

ID	Name	Date Modified	Download	Delete
	(Create a new Library)			
596	Cs134+ Cs137	22.02.2013, 10:38:04	  	
449	Np237 in Am	05.10.2012, 17:20:06	  	
402	Am to Pu Ratio	26.07.2012, 13:29:52	  	
164	Hein-identification	17.01.2012, 19:16:21	  	
215	U-age-and-U232	19.12.2011, 09:14:34	  	
72	Background	11.05.2011, 17:49:19	  	
22	Np	10.05.2011, 09:54:09	  	
66	Calibration Sources	19.08.2010, 13:13:31	  	
67	Medical Library	08.07.2010, 16:15:27	  	
Total:	9		Page: 1 / 1	

Download or delete library

Downloading a library

Summary Create/Edit Sample Libraries Options

User defined gamma libraries

ID	Name	Date Modified	Download	Delete
	(Create a new Library)			
22	Np	10.05.2011, 09:54:09		
66	Calibration Sources	19.08.2010, 13:13:31		
67	Medical Library	08.07.2010, 16:15:27		
72	Background	11.05.2011, 17:49:19		
164	Hein-identification	17.01.2012, 19:16:21		
177	Age-U232	19.12.2011, 09:14:19		
215	U-age-and-U232	19.12.2011, 09:14:34		
402	Am to Pu Ratio	26.07.2012, 13:29:52		
449	Np237 in Am	05.10.2012, 17:20:06		
Total:	9			

Page: 1 / 1

Download

Formats:

- Gammavision -> Easy
- Identify (WESPA) -> Easy
- Genie2000 -> Requires converter

Making a library for Genie2000



















- To use a Nucleonica library with Genie2000, you need to convert it to Genie2000 format
- LibConvert: converter for Genie2000
- Works only if Genie2000 is installed on your system!
- To obtain a copy: write an e-mail to info@nucleonica.com

 LibConvert

Making a library for Genie2000

Summary Create/Edit Sample Libraries Options

User defined gamma libraries

ID	Name	Date Modified	Download	Delete
	(Create a new Library)			
22	Np	10.05.2011, 09:54:09		
66	Calibration Sources	19.08.2010, 13:13:31		
67	Medical Library	08.07.2010, 16:15:27		
72	Background	11.05.2011, 17:49:19		
164	Hein-identification	17.01.2012, 19:16:21		
177	Age-U232	19.12.2011, 09:14:19		
215	U-age-and-U232	19.12.2011, 09:14:34		
402	Am to Pu Ratio	26.07.2012, 13:29:52		
449	Np237 in Am	05.10.2012, 17:20:06		
Total:	9			

Page: 1 / 1

Download in
intermediate
format for
Genie2000

Save library to your PC then start the LibConvert program

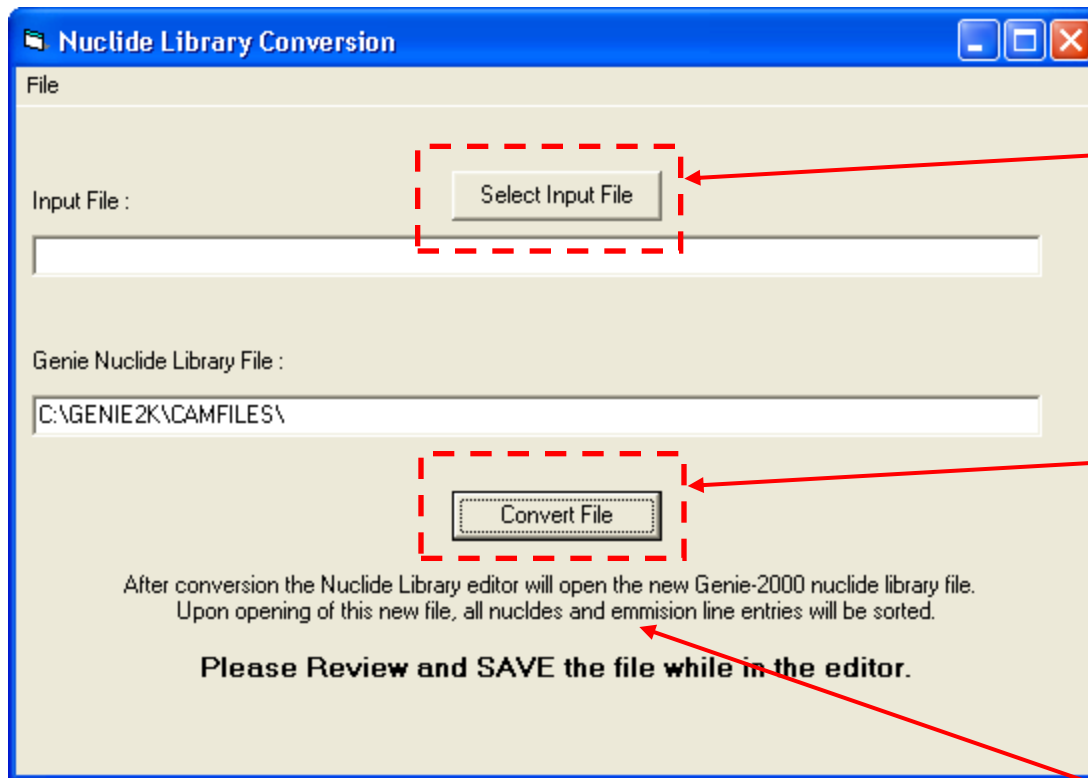


Double-click the LibConvert
executable on your PC

Making a library for Genie2000

LibConvert: converter for Genie2000

 LibConvert



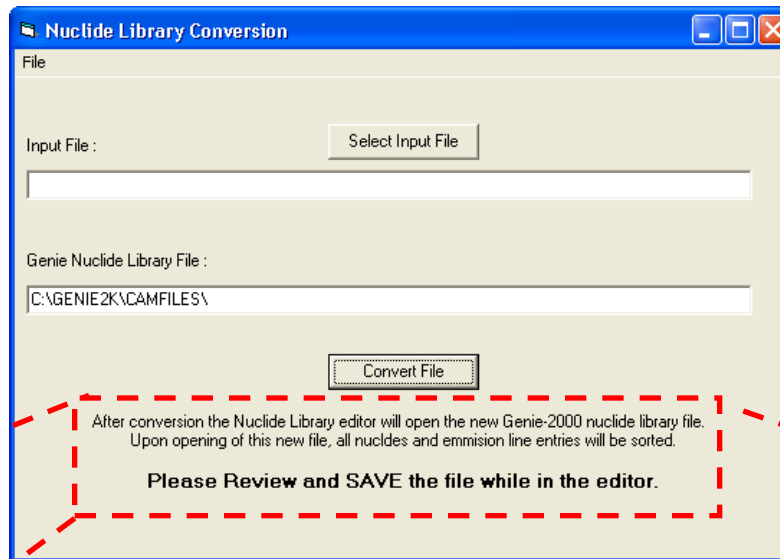
Select Input File

Convert file

Read this!

Making a library for Genie2000

LibConvert: converter for Genie2000



After conversion the Nuclide Library editor will open the new Genie-2000 nuclide library file.
Upon opening of this new file, all nuclides and emission line entries will be sorted.

Please Review and SAVE the file while in the editor.

Making a library for Genie2000

Genie2000 Nuclide Library Editor

Nuclide Library Editor: Genie2000_Np237 in Am.nlb*

File Search Options Help

Nuclide

Name: Half-Life: ☐ Y ☐ D
 Full Name: ☐ H ☐ M
 Type: ☐ S

Energy Lines

Energy: keV Abundance: % ☐ Key Line
 Uncertainty: keV Uncertainty: Abs ☐ No Wt Mean

Name	Type	Half Life	Energy - keV	Abundance - %
Pa233	B-	2.333e+006S		
			75.28	1.3100
			86.59	2.0000
			248.30	0.0470
			271.48	0.3200
			300.12	6.6200
			311.98	38.6500
			340.54	4.5000

File: Save

Some good advice:

First look at the spectrum

Then guess which nuclides can be expected

Create a new library and start adding nuclides and energies

For more
info look
at the
Nucleonica
Wiki:



Help



May-2015

Exercise

Create a gamma library for a set of calibration sources, with the energies given below:

^{241}Am

59.54 keV

^{137}Cs ($^{137\text{m}}\text{Ba}$)

661.7 keV

^{60}Co

1173 and 1332 keV